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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/705,865 | 11/13/2003 | Yuli Bilik | 3087/1 | 6303 |

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EXAMINER

WHITTINGTON, KENNETH

ART UNIT

PAPER NUMBER

2862

DATE MAILED: 03/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

| | | | |
|------------------------------|--|-------------------------------------|--|
| Office Action Summary | Application No. 10/705,865 | Applicant(s) BILIK ET AL. | |
| | Examiner Kenneth J Whittington | Art Unit 2862 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-10 is/are allowed.
- 6) ☒ Claim(s) 11, 15-23 and 25-33 is/are rejected.
- 7) ☒ Claim(s) 12-14, 24 and 34 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>8/17/04</u> . | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION***Drawings***

The drawings are objected to because the drawing shown in FIG. 7b should be in FIG. 7c and vice versa. The Disclosure on page 17, line 33 to page 18, line 33 refers to these drawings, however, the references to these drawings should be reversed.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

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corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

5 Claims 20 and 24 are objected to because of the following informalities: "said transducer core" and "said core" lack antecedent basis. Perhaps, amending these claims to depend from claim 17 would overcome the objection. Appropriate correction is required.

10

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

15 (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

25

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
- 5 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 11, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedengren (US 5,237,271) in view of
10 Steingroever et al. (US 3,922,599) and Kacprzak et al.

(Interpretation of Printed Circuit Boards' Structures via Amplitude and Signal Phase Obtained from the ECT Testing).

Hedengren teaches an eddy current transducer for non-destructive testing of conductive material layers comprising an excitation
15 mechanism to induce multi-frequency, multi-amplitude eddy currents in the layers (See Hedengren FIG. 9, note that differing frequencies are input into the coils and further note that the differing diameter of the coils inputted with the same current provides different fluxes emanating from the coil, and
20 thus, different amplitudes of currents would be induced into the material layers). However, Hedengren does not explicitly disclose a direct current bias mechanism. Steingroever et al. teaches a biasing mechanism for an eddy current sensor for pre-magnetizing the core which changes the operating regimes of the
25 eddy current sensor to make it more sensitive or provide better resolution (See Steingroever et al. FIGS. 4 and 7 and see col. 2, lines 10-28). The bias system can be a coil surrounding the

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core or alternatively incorporated into the detection coils (See FIGS. 4 and 7). It would have been obvious to use the biasing mechanism of Steingroever et al. in the transducer of Hedengren. One having ordinary skill in the art would have been motivated
5 to do so to increase the sensitivity of the instrument regardless of the layer thickness (See col. 2, lines 10-28).

The combination also fails to disclose using such transducer to examine PCBs. Kacprzak et al. teaches of using eddy current sensors to examine PCBs. It would have been
10 obvious to use the transducer of Hedengren in view of Steingroever et al. to examine PCBs. One having ordinary skill in the art would have been motivated to do so reduce probability of creating a defect during testing and no complicated software is required (See Kacprzak et al. page 1).

15 Claims 17-19, 21 and 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedengren in view of Steingroever et al. and Kacprzak et al. as applied to claim 16 above, and further in view of Katabami (US 3,528,004). The
20 noted combination teaches the limitations of claim 16. However, regarding claims 17 and 21, the combination does not teach the coil/core design recited in the claims. Katabami teaches a tapering core design with the coil wrapped around for use in an

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eddy current sensor, the taper is conical, ending in a substantially pointed end (See Katabami FIG. 4). It would have been obvious to use the taper of Katabami in the noted combination. One having ordinary skill in the art would have
5 been motivated to do so to increase the sensitivity of the eddy current probe (See Katabami col. 4, lines 22-43). Furthermore, the combination "facilitates" the induction of multi-frequency, multi-amplitude eddy currents in the tested PCB using this coil wrapped around the core, since the combination teaches at least
10 one coil wrapped about a core for creating such currents in the PCB.

Regarding claims 18 and 19, the combination teaches the bias coil surrounding the core or alternatively incorporated into the detection coils (See Steingroever et al. FIGS. 4 and
15 7).

Regarding claims 30 and 31, the combination as outlined above with respect to claims 16 and 17 teaches the limitations of these claims.

Regarding claims 32 and 33, the combination teaches the
20 bias coil surrounding the core or alternatively incorporated into the detection coils (See Steingroever et al. FIGS. 4 and 7).

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Claims 20, 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedengren in view of Steingroever et al., Kacprzak et al. and Katabami, as applied to claim 16 above, and further in view of Nix et al. (US 3,986,105). The noted
5 combination teaches the limitations of claim 16. However, the combination does not teach an external concentrator. Nix et al. Teaches an external concentrator positioned adjacent the sample to be tested connected by rigid connection and consisting of a flat ferrite substrate (See Nix et al. FIG. 2, item 12 and col.
10 4, lines 25-56). It would have been obvious to a person having ordinary skill in the art to apply such a magnetic base to the combination noted. One having ordinary skill in the art would have been motivated to do so to provide a flux guide for the magnetic field emanating from the coil and increase the
15 production of eddy currents in the PCB.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hedengren in view of Steingroever et al., Kacprzak et al. and Katabami, as applied to claim 17 above, and
20 further in view of Viertl (US 5,430,376). The noted combination teaches the limitations of claim 17. However, this combination does not teach the body material, a ferrite ring or a protective ring. Viertl teaches a polymer body material having the coil

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and core therein, a ferrite ring surrounding the coil and a protective ring portion of the body to protect the coil and core (See Viertl FIG. 3A, items 30, 33 and 34). It would have been obvious to use such features in the transducer of the noted combination. One having ordinary skill in the art would have been motivated to do so to protect the coil from damage thereby extending the coils life (See col. 5, line 39 to col. 6, line 3), prevent flux from leaking from the transducer and shield the transducer from external magnetic fields.

10

Claims 26, 27, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hedengren in view of Steingroever et al., Kacprzak et al. and Katabami, as applied to claim 16 above, and further in view of Collingwood et al. (US 2003/0025497). The noted combination teaches of inducing multiple frequency and multiple amplitude eddy currents in a PCB. However, this combination does not teach developing the data into information regarding data from each side of the PCB. Collingwood et al. teaches using such multiple frequency and amplitude signals to develop a profile of a substrate using a subtraction and normalization procedure (See Collingwood et al. in the Summary of the Invention). It would have been obvious to a person having ordinary skill in the art to use such

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information to develop a profile of the PCB so that the person could determine the existence of flaws in the PCB.

Regarding claims 28 and 29, it is noted that portions of the process of the Collingwood et al. procedure process the
5 output information in parallel and portions in process the information series (See Collingwood et al. page 3, paragraph 0031).

Allowable Subject Matter

10 Claims 1-10 are allowed.

Claims 12, 13, 14, 24, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15 Regarding claims 1-10 and 12-14, the following is an examiner's statement of reasons for allowance: while the prior art does disclose using a pair of coils and cores to create multi-frequency and multi-amplitude signals, the prior art does not teach inducing such signals into the single ferrite core as
20 recited in the claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

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fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Regarding claims 12-14, the following is an examiner's statement of reasons for allowance: while the prior art does
5 disclose using a pair of coils and cores to create multi-frequency and multi-amplitude signals, the prior art does not teach inducing such signals into the single ferrite core as recited in the claims.

Regarding claim 24, in view of the objection noted above,
10 the following is a statement of reasons for the indication of allowable subject matter: while the prior art discloses flux concentrators, the prior art does not disclose a particular flux concentrator having a flux concentrator having a shape similar to the core recited in claim 17.

15 Regarding claim 34, while the prior art does disclose using a pair of coils and cores to create multi-frequency and multi-amplitude signals, the prior art does not teach inducing such signals using a single transducer, comprising a single coil wrapped around a core, as recited in the claim.

20

Conclusion

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hentschel (US 3,619,771) teaches reasons for optimizing a frequency used in eddy current inspection. Weirs (US 3,753,096) and Schenk, Jr. et al. (US 4,554,095) teach core and coil designs for an eddy current probe. Flora et al. (US 4,207,520) teaches a multiple frequency eddy current inspection system. Watanable et al. (US 3,890,564) teaches eddy current probes on each side of a substrate for testing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J Whittington whose telephone number is (571) 272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

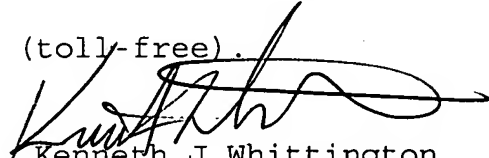
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status

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information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

5 Business Center (EBC) at 866-217-9197 (toll-free).



Kenneth J Whittington
Examiner
Art Unit 2862

kjw



JAY PATIDAR
PRIMARY EXAMINER